PATENT COOPERATI ! TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

To:

Assistant Commissioner for Patents
United States Patent and Trademark Office
Box PCT
Washington, D.C.20231
ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

Date of mailing (day/month/year) 06 June 2000 (06.06.00)	
International application No. PCT/US99/21639	**Applicant's or agent's file reference** 3847/64987
International filing date (day/month/year) 17 September 1999 (17.09.99)	**Priority date** (day/month/year) 21 September 1998 (21.09.98)
Applicant EVANS, James, M. et al	

1. The designated Office is hereby notified of its election made:

[X] in the demand filed with the International Preliminary Examining Authority on:

13 April 2000 (13.04.00)

[ ] in a notice effecting later election filed with the International Bureau on:

2. The election [X] was

[ ] was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO **34, chemin des Colombettes** **1211 Geneva 20, Switzerland**	Authorized officer Olivia RANAIVOJAONA
Facsimile No.: (41-22) 740.14.35	Telephone No.: (41-22) 338.83.38

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PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 3847/64987	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/US99/21639	International filing date *(day/month/year)* 17 SEPTEMBER 1999	Priority date *(day/month/year)* 21 SEPTEMBER 1998
International Patent Classification (IPC) or national classification and IPC IPC(7): C22C 21/00 and US Cl.: 148/437, 438, 439, 440; 420/528, 546		
Applicant GIBBS DIE CASTING ALUMINUM CORPORATION		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 5 sheets.

☒ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority. (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 4 sheets.

3. This report contains indications relating to the following items:

- I [X] Basis of the report
- II [ ] Priority
- III [ ] Non-establishment of report with regard to novelty, inventive step or industrial applicability
- IV [X] Lack of unity of invention
- V [X] Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI [ ] Certain documents cited
- VII [ ] Certain defects in the international application
- VIII [ ] Certain observations on the international application

Date of submission of the demand	Date of completion of this report
13 APRIL 2000	06 DECEMBER 2000
Name and mailing address of the IPEA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230	Authorized officer SIKYIN IP Telephone No. (703) 308-2542

Form PCT/IPEA/409 (cover sheet) (July 1998) ★

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/US99/21639

I. Basis of the report

1. With regard to the **elements** of the international application:*

[ ] the international application as originally filed

[X] the description:
pages 1-10 , as originally filed
pages NONE , filed with the demand
pages NONE , filed with the letter of _____

[X] the claims:
pages NONE , as originally filed
pages NONE , as amended (together with any statement) under Article 19
pages 11-14 , filed with the demand
pages NONE , filed with the letter of _____

[X] the drawings:
pages 1 , as originally filed
pages NONE , filed with the demand
pages NONE , filed with the letter of _____

[X] the sequence listing part of the description:
pages NONE , as originally filed
pages NONE , filed with the demand
pages NONE , filed with the letter of _____

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.
These elements were available or furnished to this Authority in the following language _____ which is:

[ ] the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).

[ ] the language of publication of the international application (under Rule 48.3(b)).

[ ] the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

[ ] contained in the international application in printed form.

[ ] filed together with the international application in computer readable form.

[ ] furnished subsequently to this Authority in written form.

[ ] furnished subsequently to this Authority in computer readable form.

[ ] The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

[ ] The statement that the information recorded in computer readable form is identical to the writen sequence listing has been furnished.

4. [X] The amendments have resulted in the cancellation of:

[X] the description, pages NONE

[X] the claims, Nos. NONE

[X] the drawings, sheets~~/fig~~ NONE

5. [ ] This report has been drawn as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

** Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).*

***Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.*

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/US99/21639

IV. Lack of unity of invention

1. In response to the invitation to restrict or pay additional fees the applicant has:

   ☐ restricted the claims.

   ☒ paid additional fees.

   ☐ paid additional fees under protest.

   ☐ neither restricted nor paid additional fees.

2. ☐ This Authority found that the requirement of unity of invention is not complied with and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees.

3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is

   ☐ complied with.

   ☒ not complied with for the following reasons:

As applicant was previously notified this International Preliminary Examining Authority has found plural inventions claimed in the International Application covered by the claims indicated below:

This application contains the following inventions or groups of inventions which are not so linked as to form a single inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

Group I, claim(s) 1-31, are drawn to aluminum base alloys.
Group II, claim(s) 32, is drawn to a method of producing components by die casting an aluminum base alloy with reduced die soldering.

and it considers that the International Application does not comply with the requirements of unity of invention (Rules 13.1, 13.2 and 13.3) for the reasons indicated below:

The inventions listed as Groups I-II do not relate to a single inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: Claim 1 is anticipated or obvious over, e.g., JP 63274735. As the recited Al base alloy composition does not make a contribution over the prior art, unity of invention is lacking and restriction is appropriate.

4. Consequently, the following parts of the international application were the subject of international preliminary examination in establishing this report:

   ☒ all parts.

   ☐ the parts relating to claims Nos. _.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/US99/21639

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. statement

Novelty (N)	Claims	1-32	YES
	Claims	NONE	NO
Inventive Step (IS)	Claims	26	YES
	Claims	1-25 and 27-32	NO
Industrial Applicability (IA)	Claims	1-32	YES
	Claims	NONE	NO

2. citations and explanations (Rule 70.7)

Claims 1, 5-20, and 28-31 lack an inventive step under PCT Article 33(3) as being obvious over USP 5151136 to Witters et al.

Claims 1-9, 11, 15-20, and 32 lack an inventive step under PCT Article 33(3) as being obvious over JP 63274735.

Claims 1-9 and 11-19 lack an inventive step under PCT Article 33(3) as being obvious over JP 09125182.

Claims 1, 5-25, and 27-31 lack an inventive step under PCT Article 33(3) as being obvious over JP 10226839.

Claims 1, 5-9, and 11-20 lack an inventive step under PCT Article 33(3) as being obvious over JP 10152762 or JP 10152744.

The cited references disclose the features substantially as claimed. The disclosed features include Al base alloys and their compositions. The features relied upon described above can be found in the references at their abstracts and Witters et al col. 2, lines 27-37. Therefore, the subject matter as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made to have selected the overlapping portion of the subject matter disclosed by the reference. Overlapping ranges have been held to be a prima facie case of obviousness. The cited references may not disclose the elongation as set forth in claim 5, for example, but since the claimed property is material property which would have been inherently possessed by the Al base alloys of cited references.

As is evidence by the cited JP 63274735 patent publication that die casting Al base alloy is one of the conventional casting methods for Al base alloy and is contemplated within ambit of ordinary skill artisan. Since the proportion of each element in claim 32 is consistent with known aluminum alloy, therefore, it would be obvious to cast conventional Al base alloy by die casting.

Claim 26 meets the criteria set out in PCT Article 33(2)-(3), because (Continued on Supplemental Sheet.)

Supplemental Box
(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: Boxes I - VIII

V. 2. REASONED STATEMENTS - CITATIONS AND EXPLANATIONS (Continued):
the prior art does not teach or fairly suggest the composition as set forth in said claim.

Claims 1-32 meet the criteria set out in PCT Article 33(4), because the claimed Al base composition has industry application such as automotive parts.

---------- NEW CITATIONS ----------
NONE

PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(30) Priority Data:
60/101,313 21 September 1998 (21.09.98) US

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(72) Inventors; and
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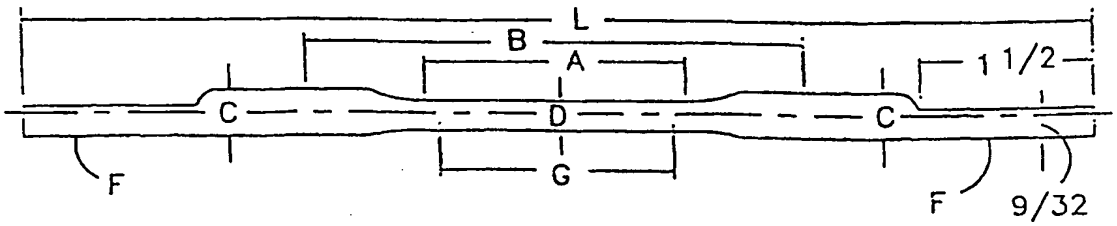
(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published
With international search report.
With amended claims and statement.

Date of publication of the amended claims and statement:
8 June 2000 (08.06.00)

(54) **Title:** ALUMINUM DIE CAST ALLOY HAVING HIGH MANGANESE CONTENT



(57) **Abstract**

Modified die–castable aluminum alloys resistant to mold soldering with low iron content and a higher manganese content by weight are disclosed. In each alloy the iron content is less than 0.6 % by weight and the manganese content is about 1.0–2.0 % by weight.

FOR THE PURPOSES OF INFORMATION ONLY

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AMENDED CLAIMS

[received by the International Bureau on 31 March 2000 (31.03.00);
original claims 1-11, 13, 14, 16-20 amended; new claims 21-32 added;
remaining claims unchanged (4 pages)]

1. An aluminum based alloy, said alloy comprising:

1.0 - 2.0% by weight manganese;

a maximum of 0.6% by weight iron;

less than 0.003% by weight beryllium;

the remainder being aluminum; and

said alloy characterized by reduced die soldering when used in die casting operations.

2. The aluminum alloy of claim 1 further comprising 2.5 - 4.0% by weight magnesium and 0.001-0.003% by weight beryllium and said alloy characterized by an elongation value of at least 17%.

3. The aluminum alloy of claim 2 further comprising a maximum of 0.45% by weight silicon.

4. The aluminum alloy of claim 3 further comprising a maximum of 0.10% by weight copper.

5. The aluminum alloy of claim 1 further comprising a maximum of 0.45% by weight silicon and said alloy characterized by an elongation value of at least 17%.

6. The aluminum alloy of claim 5 further comprising 2.5 - 4.0% by weight magnesium.

7. The aluminum alloy of claim 1 further comprising less than 1.75% by weight magnesium.

8. The aluminum alloy of claim 7 further comprising a maximum of 0.10% by weight zinc.

9. The aluminum alloy of claim 7 further comprising a maximum of 0.2% by weight titanium.

10. The aluminum alloy of claim 8 further 4.2 - 5.0% by weight copper.

11. The aluminum alloy of claim 8 further a maximum of 0.2% by weight copper.

12. An aluminum based alloy for use in forming a die cast product, said alloy having an elongation value of at least 17%, said alloy comprising

2.5 - 4.0% by weight magnesium;

1.0 - 2.0% by weight manganese;

0.25 - 0.6% by weight iron;

0.2 - 0.45% by weight silicon;

less than 0.003% by weight beryllium;

the remainder being aluminum.

13. The aluminum alloy of claim 12 further comprising 0.05 - 0.10% by weight copper.

14. The aluminum alloy of claim 13 further comprising a maximum of 0.10% by weight zinc.

15. A modified die-castable aluminum alloy which in its unmodified form includes iron in a certain percentage by weight to at least reduce mold soldering and manganese in a lower percentage by weight than the iron comprising:

a maximum of 0.6% by weight iron; and

manganese in a percent by weight higher than the percentage by weight of iron.

16. The aluminum alloy of claim 15 wherein the manganese is present at 1.0 - 2.0% percent by weight.

17. The aluminum alloy of claim 15 wherein the manganese is present in a percent by weight higher than the certain percent by weight of iron in the unmodified form of the alloy.

18. The aluminum alloy of claim 15 wherein the manganese is present at about 1.0% percent by weight.

19. A structural article of manufacture comprising an aluminum alloy having a yield strength of greater than or equal to 11.95 kgf/mm^2 and an elongation value of greater than or equal to 18%, said aluminum alloy comprising

2.5 - 4.0% by weight magnesium;

1.0 - 2.0% by weight manganese;

a maximum of 0.6% by weight iron;

a maximum of 0.45% by weight silicon;

a maximum of 0.10% by weight copper;

less than 0.003% by weight beryllium;

the remainder being aluminum.

20. The article of claim 16 wherein the aluminum alloy includes about 1.1% manganese by weight.

21. A die-castable aluminum alloy comprising:

0.25-0.70% by weight magnesium

1.0 - 2.0% by weight manganese;

a maximum of 0.2% by weight iron;

6.5-7.5% by weight silicon;

a maximum of 0.2% by weight each of additional elements selected from the group of zinc, copper, titanium and beryllium;

the remainder being aluminum; and

said alloy characterized by reduced die soldering when used in die casting operations.

22. The alloy of claim 21 in which a maximum of 0.1% by weight zinc is present as an additional element.

23. The alloy of claim 22 in which a maximum of 0.2% by weight copper is present as an additional element.

24. The alloy of claim 23 in which a maximum of 0.2% by weight titanium is present as an additional element.

25. The alloy of claim 24 in which magnesium is present at 0.25-0.45% by weight.

26. The alloy of claim 24 in which 0.04-0.07 by weight beryllium is present as an additional element.

27. The alloy of claim 25 in which magnesium is present at 0.4-0.7% by weight.

28. A die-castable aluminum alloy comprising:

0.15-0.35% by weight magnesium

1.0 - 2.0% by weight manganese;

a maximum of 0.1% by weight iron;

4.2-5.0% by weight copper;

a maximum of 0.2% by weight each of additional elements selected from the group of zinc, silicon, nickel, tin, and titanium;

the remainder being aluminum; and

said alloy characterized by reduced die soldering when used in die casting operations.

29. The alloy of claim 28 in which a maximum of 0.1% by weight zinc is present as an additional element.

30. The alloy of claim 29 in which a maximum of 0.05% by weight silicon is present as an additional element.

31. The alloy of claim 30 in which a maximum of 0.2% by weight titanium is present as an additional element.

32. A method of producing components by die casting an aluminum alloy with reduced die soldering, the method comprising the steps of:

providing an aluminum alloy having magnesium, zinc, silicon, copper, beryllium, titanium, nickel, and tin present in percentages by weight consistent with a known aluminum alloy;

maintaining the iron content of the provided alloy at or below the iron content of the known aluminum alloy;

adjusting the manganese content of the alloy to between 1.0-2.0% by weight;

heating the alloy to a temperature conducive to die casting;

casting a component from the alloy; and

removing the cast component from the die.

STATEMENT UNDER ARTICLE 19(1)

Claim 1 has been amended to eliminate the recitation in the preamble that the alloy has an elongation value of at least 17% and to include the limitation in the body of the claim that the alloy is characterized by reduced die soldering. This amendment affects claims 1-11.

Claim 2 has been amended to insert the limitation that the alloy is characterized by reduced die soldering. This amendment affects claim 2-4.

Claim 5 has been amended to insert the limitations that the alloy is characterized by reduced die soldering. This amendment affects claims 5-6.

Claims 8 and 9 have been amended to change their dependency from claim 5 to claim 7.

Claim 13 has been amended to change its dependency from 11 to claim 12 and claim 14 has been amended to change its dependency from claim 12 to claim 13.

Claims 16-18 have been amended to change their dependency from claim 14 to claim 15. Claim 17 was also amended to correct typographical error.

Claims 19 and 20 have been amended to correct improper capitalization of beryllium and magnesium respectively.

New claims 28-31 are similar in scope to original claim 14 and claims 7-10 as amended. New claims 21-27 are similar in scope to claim 15-16 as originally filed and amended claims 7-9 and 11. Support for these claims is found in these claims and on page 6 line 24-page 7, line 5 of the application as originally filed.

New claim 32 is a process claim supported throughout the specification and claims of the application as originally filed.

The amended claims and new claim 21-32 point out more particularly, and distinctly define, that which the Applicants regard as their invention.

CLAIMS

What is claimed is:

1. An aluminum based alloy having an elongation value of at least 17%, said alloy comprising

1.0 - 2.0% by weight manganese;

a maximum of 0.6% by weight iron;

less than 0.003% by weight beryllium;

the remainder being aluminum.

2. The aluminum alloy of claim 1 further comprising 2.5 - 4.0% by weight magnesium and 0.001-0.003% by weight beryllium.

3. The aluminum alloy of claim 2 further comprising a maximum of 0.45% by weight silicon.

4. The aluminum alloy of claim 3 further comprising a maximum of 0.10% by weight copper.

5. The aluminum alloy of claim 1 further comprising a maximum of 0.45% by weight silicon.

6. The aluminum alloy of claim 5 further comprising 2.5 - 4.0% by weight magnesium.

7. The aluminum alloy of claim 1 further comprising less than 1.75% by weight magnesium.

8. The aluminum alloy of claim 5 further comprising a maximum of 0.10% by weight zinc.

9. The aluminum alloy of claim 5 further comprising a maximum of 0.2% by weight titanium.

10. The aluminum alloy of claim 8 further 4.2 - 5.0% by weight copper.

11. The aluminum alloy of claim 8 further a maximum of 0.2% by weight copper.

12. An aluminum based alloy for use in forming a die cast product, said alloy having an elongation value of at least 17%, said alloy comprising

2.5 - 4.0% by weight magnesium;

1.0 - 2.0% by weight manganese;

0.25 - 0.6% by weight iron;

0.2 - 0.45% by weight silicon;

less than 0.003% by weight beryllium;

the remainder being aluminum.

13. The aluminum alloy of claim 11 further comprising 0.05 - 0.10% by weight copper.

14. The aluminum alloy of claim 12 further comprising a maximum of 0.10% by weight zinc.

15. A modified die-castable aluminum alloy which in its unmodified form includes iron in a certain percentage by weight to at least reduce mold soldering and manganese in a lower percentage by weight than the iron comprising:

a maximum of 0.6% by weight iron; and

manganese in a percent by weight higher than the percentage by weight of iron.

16. The aluminum alloy of claim 14 wherein the manganese is present at 1.0 - 2.0% percent by weight.

17. The aluminum alloy of claim14 wherein the manganese is present in a percent by weight higher than the certain percent by weigh of iron in the unmodified form of the alloy.

18. The aluminum alloy of claim 14 wherein the manganese is present at about 1.0% percent by weight.

19. A structural article of manufacture comprising an aluminum alloy having a yield strength of greater than or equal to 11.95 kgf/mm^2 and an elongation value of greater than or equal to 18%, said aluminum alloy comprising

2.5 - 4.0% by weight magnesium;

1.0 - 2.0% by weight manganese;

a maximum of 0.6% by weight iron;

a maximum of 0.45% by weight silicon;

a maximum of 0.10% by weight copper;

less than 0.003% by weight Beryllium;

the remainder being aluminum.

20. The article of claim 16 wherein the aluminum alloy includes about 1.1% Manganese by weight.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US99/21639

A. CLASSIFICATION OF SUBJECT MATTER
IPC(7) :C22C 21/00
US CL : 148/437, 438, 439, 440; 420/528, 546
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 148/437, 438, 439, 440; 420/528, 546

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

NONE

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

Please See Extra Sheet.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP 09125182 A2 (SUMITOMO ALUM K.K.) 13 May 1997, abstract.	1, 4-8, 11-19
X	JP 10152744 A2 (MITSUBISHI CABLE INDUSTRIES, LTD) 09 June 1998, abstract.	1, 5-8, 11-19.
X	JP 10152762 A2 (FURUKAWA ELECTRIC COL, LTD) 09 June 1998, abstract.	1, 5-8, 11-19.
X	JP 10226839 A2 (SUMITOMO ELECTRIC INDUSTRIES, LTD) 25 August 1998, abstract.	1, 5-8, 11-19.
X	JP 63274735 A2 (RYOBI, LTD) 11 November 1988, abstract.	1-8, 10-11, 14-19.
X	US 5,151,136 A (WITTERS ET AL.) 29 September 1992, col. 2, lines 27-49.	1, 5-19

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

*	Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A"	document defining the general state of the art which is not considered to be of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
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Date of the actual completion of the international search 14 JANUARY 2000	Date of mailing of the international search report 02 February 2000 (02.02.00)
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230	Authorized officer SIKYIN IP Telephone No. (703) 308-0661

Form PCT/ISA/210 (second sheet)(July 1992)*

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US99/21639

B. FIELDS SEARCHED
Electronic data bases consulted (Name of data base and where practicable terms used):

CAS ONLINE
search terms: aluminum, Al, manganese, Mn, iron, Fe, beryllium, Be, magnesium, Mg, silicon, Si, copper, Cu, zinc, Zn, titanium, Ti.